

Gabriel E. Lipkowitz

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Portfolio

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Personal website

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Scholar

Education

Stanford University Stanford, CA
PhD in Mechanical Engineering 2020 – Present
Research focus: Computational design and fabrication, spatial computing /
extended reality
Teaching focus: Parametric and generative design
Advisors: Professors Joseph DeSimone and Eric S.G. Shaqfeh
Anticipated graduation: June 2024

Imperial College London London, UK
MSc in Applied Computational Science and Engineering 2019 – 2020
Graduated with highest honors
Advisors: Professors J.P. Latham and Eleanor Schofield

Princeton University Princeton, NJ
Bachelor of Arts in Biology 2015 – 2019
Graduated summa cum laude

Awards and Fellowships

Fulbright Scholarship (US/UK Fulbright Commission) 2019-2020
NSF Graduate Research Fellowship 2020 - Present
Solid Freeform Fabrication Symposium NSF Student Award 2022, 2023
Data Science Institute Fellow (University of Virginia) 2019
Sigma Xi thesis award, Princeton University 2019

Research Publications (Conferences)

Palette-PrintAR: augmented reality design and simulation for multicolor resin 3D printing
Lipkowitz, G., Shaqfeh, E.S.G., and DeSimone, J.M.
Accepted: *Association for Computing Machinery, Conference on Human Factors in Computing Systems, Full Paper, 2024.*

Palette-PrintAR: an augmented reality fluidic design tool for multicolor resin 3D printing
Lipkowitz, G., Shaqfeh, E.S.G., and DeSimone, J.M.
Association for Computing Machinery, Symposium on User Interface Software and Technology, Late-Breaking Work, 2023.

Paraflow: A Computational Design Tool for Support-free Multimaterial 3D Printing
Lipkowitz, G., Shaqfeh, E.S.G. and DeSimone, J.M.
Association for Computing Machinery, Conference on Human Factors in Computing Systems, Late-Breaking Work, 2023.

Printing atom-efficiently: faster fabrication of farther unsupported overhangs by fluid dynamics simulation
Lipkowitz, G., Krishna, N. Coates, I., Shaqfeh, E.S.G., and DeSimone, J. M.
Association for Computing Machinery, Symposium on Computational Fabrication, Full paper, 2023.

Interactive Fluid Dynamics Simulation with Real-time Visualization for Augmented Resin 3D Printing
Lipkowitz, G., DeSimone, J.M.

International Solid Freeform Fabrication Symposium, Full Paper, 2023.

Generative co-design for microfluidics-accelerated 3D printing

Lipkowitz, G., Shafqeh, E.S.G., DeSimone, J.M.

Association for Computing Machinery, Symposium on Computational Fabrication, Demonstration track, 2022.

Fluidics-Informed Fabrication: A Novel Co-design for Additive Manufacturing Framework

Lipkowitz, G., Shafqeh, E.S.G. and DeSimone, J.M.

International Conference on Human-Computer Interaction, Full Paper, 2023.

Digital Microfluidic Design for Injection Continuous Liquid Interface Production of 3D Objects

Lipkowitz, G., ..., Shafqeh, E.S.G., DeSimone, J.M.D

International Solid Freeform Fabrication Symposium, Full Paper, 2022.

Research

Publications (Journals)

Injection continuous liquid interface production of 3D objects

Lipkowitz, G., Samuelsen, T., Hsiao, K., Lee, B., ... DeSimone, J. M.

Science Advances, 2022.

Growing three-dimensional objects with light

Lipkowitz, G.*, Saccone, M.*, ..., and DeSimone, J.M.

* Authors contributed equally to this work.

Accepted: *Proceedings of the National Academy of Sciences*

Bioinspired fluidic design for additive manufacturing

Lipkowitz, G., Krishna, N., Coates, I., Shafqeh, E.S.G., and DeSimone, J.M.

Under review: *Nature*

Single-digit-micrometer-resolution continuous liquid interface production

Hsiao, K., Lee, B. J., Samuelsen, T., Lipkowitz, G., ..., DeSimone, J. M.

Science Advances, 2022.

Teaching

CEE 220C: Parametric Design and Optimization

Teaching assistant

Spring 2022

Department of Civil and Environmental Engineering, Stanford University

This course explores tools and techniques for computational design and parametric modeling as a foundation for design optimization.

CEE 220A: Building Modeling for Design

Head teaching assistant

Summer 2022

Department of Civil and Environmental Engineering, Stanford University

This course introduces techniques for creating, managing, and applying of building information models in the building design and construction process.

CS11SI: How to Build VR - An Introduction to Virtual Reality Design

Student-initiated course project advisor

Fall 2023

Department of Computer Science, Stanford University

This course introduces students to development for virtual reality technologies.

	<p>Biodesign collaboratory teaching associate Spring 2022 - Present <i>Byers Center for Biodesign, Stanford University</i> Mentored post-graduate students in computer-aided design and digital fabrication workflows using 3D printers, laser cutters, and 3D scanners.</p>
	<p>Graduate teaching assistant Spring 2023 - Present <i>Uytengsu Undergraduate Teaching Lab, Stanford University</i> Mentored undergraduates in CAD practices and installed 3D printers for use in undergraduate courses and extracurricular projects.</p>
	<p>CS12SI: Spatial Computing Workshop Spring 2024 <i>Student-initiated course instructor</i> Stanford University Course to expose students to the basics of Apple Vision Pro development using principles of spatial design and visionOS, including using SwiftUI and Unity PolySpatial workflows.</p>
Exhibits	<p>G-code is my love language <i>San Jose State University</i> November 2023 - February 2024 <i>Fabrication lead</i> Fabricated and helped to design invited artists' pieces for 3D printing, and contributed augmented reality-based exhibit tool.</p>
Industrial work	<p><i>Stanford XR Project Incubator</i> Organizer (Winter 2023 - Present) Mentored by members of Apple's Vision Products Group (VPG), translating XR design academic research conducted at Stanford into prototype visionOS application for deployment to Apple Vision Pro.</p> <p><i>Immerse the Bay Hackathon</i> Organizer (Fall 2023) With Stanford XR and external contributors, mentors, and judges from Apple, Unity, ShapesXR, Foundary, and other AR/VR companies, helped to organize a XR hackathon with 300 hackers (largest in Bay Area history).</p> <p><i>Layer Construction</i> Chief Technology Officer (2022-Present) Start-up (stealth mode) focusing on mobile 3D printing for concrete construction. My role focuses on developing computer vision machine learning models for robot navigation in unstructured environments.</p> <p><i>Methods and Systems for Making Polymeric Microstructures</i> Patent issued (2023) <u>Lipkowitz, G.</u> Dulay, M., Samuelsen, T. Shaqfeh, E.S.G., DeSimone, J.M.</p> <p><i>Polymeric Structures having a Micro-void space and Methods for Making the Same</i> Patent pending Coates, I. <u>Lipkowitz, G.</u> DeSimone, J.M.</p>
External Talks & Presentations	<p><i>Printing atom-efficiently: faster fabrication of farther unsupported overhangs by fluid dynamics simulation</i> Oral presentation ACM Symposium on Computational Fabrication New York City, NY USA, October 2023</p>

Demonstrating Paraflow: Interactive fluid dynamics simulation with real-time visualization for augmented resin 3D printing
Oral presentation
International Solid Freeform Fabrication Symposium
Austin TX USA, August 2023

Designing data: Methods for 3D synthetic data generation for computer vision machine learning
Invited lecture
COMPSCI C8: Foundations of Data Science
UC Berkeley, August 2023

Multimaterial 3D printing by injection continuous liquid interface production
Oral presentation
eWEAR Annual Symposium
Stanford University, February 2023

Accelerated 3D printing with injection continuous liquid interface production
Presentation
Stanford Bio-X Symposium
Stanford University, August 2022

Injection continuous liquid interface production
Additive Manufacturing of Soft Materials, Gordon Research Conference
Ventura CA USA, August 2022

Digital Microfluidic Design for Injection continuous liquid interface production
Presentation at International Solid Freeform Fabrication Symposium
Austin TX USA, July 2022

Multimaterial printing by injection continuous liquid interface production
Presentation at 3D Printing-enabled Polymeric Composites and Hybrid Systems Session, American Chemical Society
San Diego CA USA, March 2022

3D Printed Buildings: Can it be green, affordable, and sustainable?
Discussion lead: CEE 132A Sustainable Architecture and Engineering Colloquium: Re:Defining Sustainability
Stanford CA USA, October 2023

Paraflow: Generative Design for 3D Printing with Fewer Supports
Applied Artificial Intelligence, Big Data, and Data Analytics Session, American Institute for Chemical Engineers
Orlando FL USA, November 7, 2023

Academic Service

Session chair, Solid Freeform Fabrication Symposium (2023)
Peer reviewer, Nature (2023)
Peer reviewer, Nature Communications (2022)
Peer reviewer, Science Advances (2022-2023)
Peer reviewer, Solid Freeform Fabrication Symposium (2023)
Peer reviewer, ACM Symposium on Computational Fabrication (2023)
Peer reviewer, ACM Conference on Human Factors in Computing Systems (2023)